REMARKS

This response is being presented in response to the Office Action of November 18, 2005. The Examiner has indicated that all of the claims, that is claims 1-4, 6-22 and 34-44, have been rejected. In the response, claim 1 has been amended. In light of the amendments and following detailed arguments, it is respectfully submitted that the claims fully distinguish over the applied prior art and are in condition for allowance.

In the action, the Examiner has rejected claims 1, 2, 4, 6-9, 17-22, 34-37 and 40-44 were rejected under 35 USC §103 as being unpatentable over Gallego et al (US 6,048,621) in view of Tracy et al and Florczak. Claims 1, 2, 6-8, 10-16, 18, 23, 34-35, 38-42 and 44 were rejected under 35 USC §103 as being unpatentable over Riaz et al (US 5,385,751) in view of Tracy et al and Florczak. Claims 1, 2, 8, 10-14, 17, 19, 34, 38-40 and 42 are rejected under 35 USC §103 as being unpatentable over Florczak in view of Proscia or vice versa, in view of Riaz. Claims 1-4, 8, 10-14, 18, 34, 38-40, 42 and 44 under 35 USC §103 were rejected as being unpatentable over Proscia (US 5,286,520) in view of Tracy et al (US 4,687,560) and Florczak (US 6,268,019), in further view of Riaz.

The present invention provides a chemical vapor deposition process for the production of a tungsten oxide coating which uses particular tungsten precursors and which is carried out in a temperature range (500°-720°) than was previously contemplated. This allows coatings to be deposited within a range of stoichiometries. The higher temperatures of the range offer advantages in the on-line production of coated glass, as there is an improved opportunity to deposit an additional coating or coatings on-line. The independent claims of the present invention were previously amended to clarify that the deposition processes occur in an on-line process, and have now been amended to indicate that the oxidant comprises an ester.

Independent claim 1 was rejected in each of the above rejections. Independent claim 1 is directed to a chemical vapor deposition process for depositing a coating comprising tungsten oxide on-line on the surface of a glass substrate to produce a solar

control glass which transmits a high percentage of incident light. The process directs a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the surface of the glass substrate. The glass substrate is at a temperature in the range 500°C to 720°C. Claim 1 has been amended to clearly show that it is being deposited in an on-line float glass production process.

Independent claim 20 was rejected under 35 USC §103 as being unpatentable over Gallego in view of Tracy and Florczak. Claim 20 is directed to a chemical vapor deposition process for coating glass. The process comprises directing a gaseous stream containing a tungsten compound and a source of oxygen on to the surface of a glass substrate thereby forming a non-stoichiometric tungsten oxide layer. The tungsten oxide layer is overcoated with a further layer.

Independent claim 38 was rejected under: 35 USC §103 as being unpatentable over Proscia in view of Tracy and Florczak and Riaz; 35 USC §103 as being unpatentable over Riaz in view of Tracy and Florczak; and 35 USC §103 as being unpatentable over Flroczak in view of Proscia or vice versa, further in view of Riaz. Independent claim 38 defines a chemical vapor deposition process for coating glass. The process includes entraining a tungsten compound in a gas by flowing the gas over a tungsten compound at a temperature below its melting point. The gaseous stream is directed onto the surface of a glass substrate thereby forming a tungsten oxide layer. The glass substrate is at a temperature in the range of 500°C to 720°C.

Independent claim 40 was rejected under each of the named rejections. Independent claim 40 defines a method of coating glass, which comprises providing a glass substrate in a chemical vapor deposition process having a temperature in the range of 500°C to 720°C. Then, preparing a gaseous stream comprising a source of oxygen and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and tungsten chloride. And finally, directing the gaseous stream on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate.

Independent claim 41 was rejected: under 35 USC §103 as being unpatentable over Gallego in view of Tracy and Florczak; and under 35 USC §103 as being unpatentable over Riaz in view of Tracy and Florczak, and Proscia in view of Tracey and Florczak and further in view of Riaz.

Claim 41 defines a chemical vapor deposition process for depositing a coating comprising tungsten oxide on the surface of a glass substrate. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and an ester are directed on to the surface of the glass substrate.

COMMENTS ON EXAMINER'S RESPONSE TO ARGUMENTS

The Examiner replies to applicant's traversal of the Tracey reference by first, indicating that the claims of the present application do not exclude plasma. The present invention is drawn to an on-line float glass process. Plasma enhanced CVD, as noted in the Tracey reference, occurs in a closed reaction chamber at very low pressure. An on-line process, as in the present application, is a continuous process occurring in an open system. At the time that the present application was filed, the fact that the present invention occurs in an open system automatically would certainly exclude, to one skilled in the art, a plasma enhanced CVD process, as such a process would be inherently incompatible with on-line processes.

The Examiner goes on to state that the use of the plasma is merely the provision of energy by different means. As noted above, the on-line process of the present invention occurs in an open system as opposed to the closed system of a plasma enhanced CVD process. Certainly, at the time the present invention was made, there was no suggestion that a plasma-enhanced process would be in any way compatible with an on-line float glass process. The plasma enhanced process of Tracey can achieve desired deposition rates merely by allowing the process to continue until a suitable coating thickness is deposited. In an on-line process, the glass sheet is moving at a significant speed through the coater, and there is thus a very limited amount of time available for the desired coating thickness to be achieved. Thus, in

view of differing conditions, differing necessary deposition rates and other factors, there is no reason to suggest that the precursors suitable for a closed plasma-enhanced CVD process would be suitable for an on-line float glass process. The Examiner's suggestion that this is merely the provision of energy by differing means is true to a point, but certainly fails to consider many other variables that are inherently present in an on-line process as opposed to a closed process.

The Examiner also states that the mere fact that applicant has recognized additional benefits that flow naturally from following the suggestions of the prior art does not constitute grounds for patentability. Applicant again disagrees with this suggestion by the Examiner. As stated above, plasma enhanced CVD is a different process than atmospheric pressure on-line CVD. Among other factors, the deposition conditions are different and the deposition rates are different. There is nothing to inherently suggest that compounds that would be suitable for one process are suitable for the other. Therefore, the Examiner's suggestion that applicants have merely identified another benefit naturally flowing from a known process is respectfully averred.

Rejection of claims 1, 2, 4-9, 17-22, 34-37 and 40-44 under 35 USC §103 as being unpatentable over Gallego et al (US 6,048,621) in view of Tracy et al and Florczak.

The Examiner acknowledges that Gallego does not teach the use of Tungsten oxyhalides or tungsten chlorides as required by the claims of the present invention. As with the preceding rejection, the Examiner relies on the disclosures of Tracy and Florczak to overcome these deficiencies.

The Examiner's attention is directed towards attachment A, which is a declaration from inventor Kevin Sanderson, who is an expert in the field. In paragraph 9 of the declaration, Mr. Sanderson notes that precursor choice is significant in on-line coating processes because of the volatility and stability of the precursors of the metal oxide. Thermal decomposition and pre-reaction must both be avoided in on-line processes. A significant discovery reflected in this invention, as noted in paragraph 10, is that the use of precursors tungsten oxy halide or tungsten chloride, both of which are

delivered as sublimed metals, volatilize to form a sufficient vapor stream, and when mixed with an oxidant which contains an ester, they do not pre react.

The Gallego reference is discussed in paragraphs 17 and 18 of the declaration, and refers back to paragraph 11 relating to the Proscia reference. The Gallego reference, as discussed in paragraph 17 of the declaration, utilizes a plasma assisted CVD process. In paragraphs 12 and 13 of the declaration, Mr. Sanderson attests that plasma assisted CVD requires that the reactants are vaporized at low temperatures and pressures. No reaction occurs until power is applied to generate a plasma. As attested, there is no possibility of a pre reaction in a plasma assisted CVD process, and so this significant concern of the present invention is a non-factor in the Gallego reference. Further, deposition rates, which are determinative of the usefulness of an on-line CVD process, are insignificant in plasma assisted CVD, as the power can continue to be applied until a coating of the desired thickness is achieved. Thus, as attested to by Mr. Sanderson, one skilled in the art of on-line CVD processes would not look to plasma assisted CVD processes for precursors, as both the reaction conditions, and process concerns (pre reaction and deposition rate) are significantly different.

Mr. Sanderson also discussed the Florczak reference in paragraphs 14, 15 and 16 of his declaration. Particularly in paragraph 15 it is noted that separate streams of reaction gas and carrier gas with titanium tetrachloride vapor must be employed to prevent pre reaction. This is contrary to the teaching of the present invention, wherein the gaseous precursor stream contains both the tungsten precursor and the oxidant. The separate streams required by Florczak are not particularly suitable for use in an on-line process. Thus Florczak is not suitable to be combined as is done by the Examiner. Even if it were to be used in conjunction with the Gallego and Tracy references, the present invention would show a significant improvement over the art in that the precursors could be combined, simplifying the invention.

The Tracy reference is discussed in paragraphs 12, 13 and 16 of the declaration. As with Gallego, Tracy uses a plasma assisted CVD process. For the same reasons as shown with Gallego, a plasma assisted CVD process is not suitable for use with the

present invention. Nor is it suitable to be used in combination with a reference showing an atmospheric pressure CVD process.

As stated previously, the use of Tracy and Florczak together suffers from additional deficiencies. The Tracy reference is not applicable to the present invention because it teaches a different process, not one that a person skilled in the art would look to when designing a CVD process. With regard to Florczak, while this reference teaches a CVD method, nothing in this reference is relevant to the *deposition of tungsten oxide*. Florczak primarily addresses the deposition of titania using the reactor described in Figure 1 of the reference. Only in the abstract, and at column 6, line 55, does Florczak suggest the use of the process with any other metals. Even here, the only other suggested metals are tin germanium and vanadium. There is *nothing to suggest to one skilled in the art that the processes of Florczak would be compatible with metals outside this group, and certainly not to tungsten*. As there is no suggestion in Tracy to use a chemical vapor deposition process, and no suggestion in Florczak that the process described therein would be compatible with any metals not listed, i.e. tungsten, there is nothing in either reference to lead one skilled in the art to combine those references. Therefore, it is respectfully submitted that the combination of these references is improper.

Therefore, it is asserted that the rejection of claims 1, 2, 4-9, 17-22, 34-37 and 40-44 under 35 USC §103 as being unpatentable over Gallego et al (US 6,048,621) in view of Tracy et al and Florczak is improper, and should be withdrawn.

Rejection of claims 1, 2, 5-8, 10-16, 18, 23, 34-35, 38-42 and 44 under 35 USC §103 as being unpatentable over Riaz et al (US 5,385,751) in view of Tracy et al and Florczak.

The Riaz reference is discussed at length in the inventor's declaration in paragraphs 19-23. Mr. Sanderson points out that Riaz discloses a CVD process for the deposition of a fluorine doped tungsten oxide coating on the surface of a glass substrate. Mr. Sanderson notes that the Riaz reference requires separate reaction

streams to avoid a propensity to pre react. In paragraph 22, Mr. Sanderson explains in additional detail why the applied references are not applicable to on-line processes.

As stated previously, with regard to the Riaz reference, the Examiner acknowledged that Riaz does not explicitly teach the use of applicant's tungsten precursor. Applicants assert that Riaz specifically teaches the use of a tungsten alkoxide precursor in a CVD process. Riaz does not explicitly or implicitly, suggest any other tungsten containing precursor. Thus, it is respectfully submitted that the disclosure of Riaz is no broader than the disclosure of the Gallego reference. Therefore, the same assertions made with regard to Gallego are also applicable against the rejection based on Riaz.

As before, applicant respectfully asserts that Tracy does not disclose a chemical vapor deposition process, as is claimed in the amended independent claims, but instead teaches a plasma deposition process, which is significantly different, and would be so recognized by one skilled in the art. Tracy, as demonstrated above, thus teaches that the reactants tungsten chloride and tungsten oxytetrachloride are useful in deposition processes carried out under vacuum, at low temperature and which use electrical energy to drive plasma formation. These processes are different from, and in fact are irrelevant to the chemical vapor deposition processes of the present invention, which are carried out at atmospheric pressure and high temperature, and which use heat to drive the reaction and not electrical energy. Thus, one skilled in the art would not look to the Tracy reference as being relevant to the present invention. Therefore, the use of the Tracy reference against the present invention is improper.

Also, the use of Tracy and Florczak together suffers from the same deficiencies asserted above. The Tracy reference is not applicable to the present invention because it teaches a different process, not one that a person skilled in the art would look to when designing a CVD process. With regard to Florczak, while this reference teaches a CVD method, nothing in this reference is relevant to the *deposition of tungsten oxide*. Florczak primarily addresses the deposition of titania using the reactor described in Figure 1 of the reference. Only in the abstract, and at column 6, line 55,

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In view of the above, the Rejection of claims 1, 2, 5-8, 10-16, 18, 23, 34-35, 38-42 and 44 under 35 USC §103 as being unpatentable over Riaz et al (US 5,385,751) in view of Tracy et al and Florczak is submitted to be improper, and it is respectfully requested that this rejection be withdrawn.

Rejection of claims 1, 2, 8, 10-14, 17, 19, 34, 38-40 and 42 under 35 USC §103 as being unpatentable over Florczak in view of Proscia or vice versa and further in view of Riaz.

The Florczak, Proscia and Riaz references have been discussed above. In light of the fact that the present invention requires an on-line oat glass process, it is respectfully submitted that this process is not obvious over the applied references. It is respectfully submitted that this rejection is improper and should be withdrawn.

Rejection of claims 1-4, 8, 10-14, 18, 23, 34, 38-40, 42 and 44 under 35 USC §103 as being unpatentable over Proscia (US 5,286,520) in view of Tracy et al (US 4,687,560) and Florczak (US 6,268,019)and further in view of Riaz.

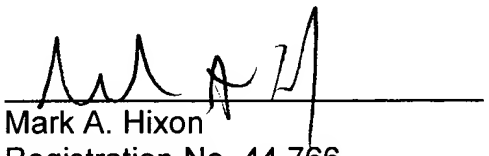
As noted above, it is respectfully submitted that the Tracy reference is not applicable against the present invention, and that this combination is therefore improper.

In view of the above, it is respectfully submitted that the rejections of claims 1-4, 8, 10-14, 18, 23, 34, 38-40, 42 and 44 under 35 USC §103 as being unpatentable over Proscia (US 5,286,520) in view of Tracy et al (US 4,687,560) and Florczak (US 6,268,019) and Riaz should be withdrawn.

Therefore, on the basis of the forgoing, it is respectfully submitted that independent claims 1, 20, 38, 40 and 41 fully distinguish over the applied references. Any dependent claims not specifically discussed hereinabove are believed to be allowable based, at least, upon their dependence on allowable base claims as discussed above.

In view of the above remarks, a favorable reconsideration of the present application and the passing of this application to issue with all claims allowed are courteously solicited. If the Examiner wishes to modify any of the language of the claims in an effort to move the application towards allowance, a telephone call to the undersigned would be greatly appreciated.

Respectfully submitted,



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